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INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)



Applicant's or agent's file reference L 1707 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA416)	
International application No. PCT/US2004/023472	International filing date (day/month/year) 21.07.2004	Priority date (day/month/year) 31.07.2003
International Patent Classification (IPC) or both national classification and IPC H01J9/24		
Applicant 3M INNOVATIVE PROPERTIES COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☐ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 31.05.2005	Date of completion of this report 07.12.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Ruiz Perez, S Telephone No. +49 89 2399-2794 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. **PCT/US2004/023472**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-29 as originally filed

Claims, Numbers

1-17 received on 31.05.2005 with letter of 31.05.2005

Drawings, Sheets

1/7-7/7 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	7-11
Inventive step (IS)	Yes: Claims	
	No: Claims	1-6,12-17
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/US2004/023472

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: PATENT ABSTRACTS OF JAPAN vol. 2000, no. 07, 29 September 2000
(2000-09-29) -& JP 2000 094329 A (DAINIPPON PRINTING CO LTD), 4 April
2000 (2000-04-04)
D3: US-A-5 853 446 (THEMONT JEAN-PIERRE ET AL) 29 December 1998
D4: EP-A-1 054 271 (NIPPON SHEET GLASS CO LTD) 22 November 2000

Independent claims 1, 7, 10 and 17

1. Claim 1

Document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows a master mold and a method of manufacturing the same (see abstract, first line) comprising:

- a support layer (2)
- a fine structure pattern supported by the support layer (figure 1d):
- the support layer being made of a material that has a lower grinding speed than the material of the fine structure pattern (see the abstract, lines 12-14).

The subject-matter of claim 1 differs from this known mould in that the fine structure is of glass or ceramic. However, as it can be seen from D3 (see column 7, line 54), master molds are usually made of glass, so the incorporation of this material into the mould disclosed in D1 would be obvious. Therefore, the subject-matter of claim 1 does not involve an inventive step (Article 33(3) PCT).

2. Claim 7

Claim 7 is drafted as a product-by-process claim. The features referring to the production process cannot confer novelty to the claim (see PCT Guidelines A5.26). The subject-

matter of claim 7 is therefore not novel (Article 33(2) PCT), as the remaining features are known from D1 (see paragraph 1 above, first lines).

3. Claim 10

The subject-matter of claim 10 is not novel in the sense of Article 33(2) PCT.

D1 discloses the following features of claim 10; a method of producing a master mold (figure 1) comprising the steps of forming a support layer (2a), forming a mask (3b and layer 1), removing the layer of a high grinding speed material selectively (figure 1c) and peeling said mask from said layer (line 14). The support layer is made of a layer comprising a low grinding speed material and a second layer of a high grinding speed material.

4. Claim 17

The subject-matter of claim 17 is directed to a method of making a flexible mold with the master mold of claim 1. A method of making a flexible mold is known from D3 (a silicon mold, see column 7, lines 50-60). The step of curing a flexible material (in this case silicon) is disclosed in D3 (column 7, line 57), curing by radiating ultraviolet light is generally known in the art. The subject-matter of claim 17 does not imply an inventive step (Article 33(3) PCT).

Dependent claims 2-6,8,9 and 11-16

The dependent claims do not contain any features which, in combination with the features of any claim to which they refer meet the requirements of the PCT in respect to novelty and/or inventive step (Articles 33 (2) and 33(3) PCT).

1. For claims 8 and 9, the arguments under point 2 above apply. As the subject-matter of claim 7 on which claims 8 and 9 depend is already known, claims 8 and 9 do not meet the criteria of Article 33(2) PCT.

2. For claims 3 and 4, see PCT Guidelines 5.23 (the mold of claim 1 is already suitable for making panel ribs or micro fluidic articles, these features not adding any novel

characteristic to claim 1).

3. The additional features of claims 2, 5-6 and 11-16 can be found in either D1 alone or in combination with D3 and D4, and are well-known in the art. For D1, a computer translation is available in the official web-site of the Japanese Patent Office. The additional feature of claims 2 and 11 can be found in this translation (see paragraph 14).

The rib structure of claims 5 and 6 is known from D3 (column 1, lines 31-42) and its incorporation to the subject-matter of claim 1 does not have any unexpected effects.

The additional features of claim 12 are known from D3, as discussed in point 1 (inventive step of claim 1).

The features of claims 13-16 are rendered obvious by, for example, the disclosure of D4, which describes processes to form a ceramic layer by spraying, enamelling, sol gel formation, etc.

Other observations

1. Independent claims 1, 7 10 and 17 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

3. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

4. The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT.

Claims:

1. A master mold comprising a support layer comprised of a ~~high grinding speed~~ material and a fine structure pattern comprised of a ~~low grinding speed~~ material supported by said support layer; ~~[=]~~.

support layer

2. The master mold of claim 1, wherein said ~~high grinding speed~~ material is a metal material.

~~3. The master mold of claim 1 or 2, wherein low grinding speed material is glass or ceramic.~~

²
3 ~~A.~~ The master mold of any of claims 1-² wherein the mold is suitable for making plasma display panel ribs.

²
4 ~~B.~~ The master mold of claims 1-² wherein the mold is suitable for making microfluidic articles.

5 ~~B.~~ The master mold of claim 1 wherein said fine structure pattern is a grid-like protrusion pattern comprising a plurality of ridge-like protrusions arranged substantially parallel while intersecting one another with predetermined gaps among them.

The
6 ~~A.~~ *A* master mold ~~comprising~~ *of claim 1,*

~~a support layer comprised of a metal material;~~

~~a fine structure pattern comprised of a glass or ceramic material formed on said support layer, wherein said fine structure pattern comprises ribs having;~~

a rib height of 150 to 300 μm ,

a rib pitch of 150 to 800 μm , and

a rib width of 50 to 80 μm .

7 ~~B.~~ A master mold comprising a support layer comprised of a ~~high grinding speed~~ material and a fine structure pattern ~~comprised of a low grinding speed material~~ supported by said

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[wherein the support layer material has a lower grinding speed than the material of the fine structure pattern]

comprises a material having a higher grinding speed than the support layer material and

support layer, wherein said fine structure pattern is formed by selectively removing said ~~low grinding speed material~~ such that a fine structure pattern is formed.

8. The master mold of claim ⁷ wherein the ~~low grinding~~ ^{high speed} material is removed by sand blasting.
9. The master mold of claim ⁷ wherein the ~~low grinding~~ ^{high speed} material is removed by chemical etching.
10. ¹⁰ 11. A method of producing a master mold comprising the steps of:
forming a support layer from a ~~low grinding speed~~ material material;
depositing a layer of a ~~high grinding speed~~ ^{high speed} material on said support layer to form a composite material layer;
forming a mask on said composite material layer;
selectively removing said layer of high grinding speed material such that the support layer is exposed; and
peeling said mask from said layer of said high grinding speed material.
11. ¹⁰ 12. The method of claim ¹⁰ 11, wherein said ~~high grinding speed~~ ^{low} material is a metal material.
12. ^{10 11} 13. The method of claim ^{10 11} 11 or 12, wherein ~~low grinding speed~~ ^{high} material is glass or ceramics.
13. ^{10 12} 14. The method of any of claims ^{10 12} 11 to 13 wherein the high grinding speed material is removed by sand blasting.
14. ^{10 12} 15. The method of any of claims ^{10 12} 11 to 13 wherein the high grinding speed material is removed by chemical etching.
15. ^{10 14} 16. The method of any of claims ^{10 14} 11 to 15, wherein the high grinding speed material is formed by spraying, enameling or a sol-gel method.

< having a higher grinding speed than the material of the support layer >

¹⁶
~~14~~ The method of any of claims ¹⁰~~11~~ to ¹⁵~~16~~, wherein said mask is formed by the steps of forming a layer of a mask-forming material on said composite material layer and then patterning it into a desired shape by photolithography.

17. A method of making a flexible mold comprising;

a) providing a master mold comprising a support layer and a fine structure pattern comprised of a material supported by said support layer; wherein the support layer is comprised of a material having a lower grinding speed than the material of the fine structure pattern;

b) applying an ultraviolet curable molding mater to the master mold;

c) laminating a support film to the master mold;

d) irradiating the molding material through the support film thereby forming a flexible mold comprising the support film and a shape imparting layer bonded to support; and

e) separating the flexible mold from the master mold.